

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Article 36 and Rule 70)

Applicant's or agent's file reference 30A-89 919	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/EP 02/13528	International filing date (<i>day/month/year</i>) 29.11.2002	Priority date (<i>day/month/year</i>) 29.11.2002
International Patent Classification (IPC) or both national classification and IPC H04L27/26		
Applicant TELEFONAKTIEBOLAGET LM ERICSSON (PUBL) et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

I ☒ Basis of the opinion

II ☐ Priority

III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

IV ☐ Lack of unity of invention

V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

VI ☐ Certain documents cited

VII ☐ Certain defects in the international application

VIII ☐ Certain observations on the international application

Date of submission of the demand 18.06.2004	Date of completion of this report 15.03.2005
Name and mailing address of the international preliminary examining authority: <div style="display: flex; align-items: center;"> <div> European Patent Office - Gitschiner Str. 103 D-10958 Berlin Tel. +49 30 25901 - 0 Fax: +49 30 25901 - 840 </div> </div>	Authorized Officer Fouasnon, O Telephone No. +49 30 25901-490



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/EP 02/13528**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-22 as originally filed

Claims, Numbers

2-14, 16, 17 as originally filed

1, 15 received on 13.12.2004 with letter of 13.12.2004

Drawings, Sheets

1/13-13/13 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

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**INTERNATIONAL PRELIMINARY
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International application No. **PCT/EP 02/13528**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	10,13,14
	No: Claims	1-9,11,12,15-17
Inventive step (IS)	Yes: Claims	
	No: Claims	1-17
Industrial applicability (IA)	Yes: Claims	1-17
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

1. Reference is made to the following document:

**D1: WO 01/99293 A (HUNTON MATTHEW J ;POWERWAVE TECHNOLOGIES
INC (US)) 27 December 2001 (2001-12-27)**

2. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1 and 15 is not new in the sense of Article 33(2) PCT.
- 2.1 Document D1 discloses the subject-matter of claim 15 (**page 19, line 20-page 20, line 15; page 20, lines 24-26; page 24, lines 22-24; page 27, lines 1-27; page 29, line 26-page 30, line 5; fig. 2, 6-9, 15, 17, and 24**):

A peak cancellation stage (**fig. 2, ref. 12**) for preventing amplitude peaks from appearing in a processed signal that has been generated from at least one baseband signal (**fig. 2, ref. $s_1..s_k$**) by one or more signal processing operations, comprising:

- a first peak cancellation unit (**fig. 6 or 7, all of ref. 80**) including:
 - a) an estimating element (**fig. 8, ref. 72**) for deriving from the baseband signal to be processed a first estimate for the processed signal, wherein the estimating element comprises an estimation filter operating based on a set of filter coefficients (**fig. 8, ref. 56**);
 - b) a detector (**fig. 15, ref. 106**) for assessing the first estimate to detect amplitude peaks;
 - c) an adjusting element (**fig. 15, ref. 104 and 110**) for adjusting the baseband signal to prevent any amplitude peaks detected in the first estimate from appearing in the processed signal;
- at least one additional peak cancellation unit (**page 20, lines 24-26**) arranged in a signal path behind the first peak cancellation unit and including:
 - a) an estimating element (**fig. 8, ref. 72**) for deriving from the adjusted baseband signal a second estimate for the processed signal, wherein the estimating element comprises an estimation filter operating based on the same set of filter coefficients like the first peak cancellation unit;

- b) a detector (**fig. 15, ref. 106**) for assessing the second estimate to detect amplitude peaks;
- c) an adjusting element (**fig. 15, ref. 104 and 110**) for further adjusting the adjusted baseband signal to prevent any amplitude peaks detected in the second estimate from appearing in the processed signal.

- 2.2 Similar reasoning applies to claim 1 which represents the same subject-matter as claim 15 under a different category.
- 3. The dependent claims do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, the reasons being as follows:
 - 3.1 The additional features of claims 2-9, 11, 12, 16, 17 are present in document **D1** (**citations in parag. 2.1**).
 - 3.2 As the method of claim 1 is known, a computer product implementing such a method cannot be considered as inventive. Therefore claims 13, 14 are not inventive.
 - 3.3 The additional technical feature of claim 10 appears to be an obvious design option for the man skilled in the art as it belongs to the common general knowledge.

Claims

1. A method of preventing amplitude peaks from appearing in a processed signal that has been generated from at least one baseband signal by one or more signal processing operations, comprising:
- 5 a) subjecting the baseband signal which is to be processed to a first peak cancellation step including:
- deriving from the baseband signal a first estimate for the processed signal, including subjecting the baseband signal to an estimation filtering operation based on a set of filter coefficients;
 - 10 - assessing the first estimate to detect amplitude peaks;
 - adjusting the baseband signal to prevent any amplitude peaks detected in the first estimate from appearing in the processed signal; and
- 15 b) subjecting the adjusted baseband signal which is to be processed to at least one additional peak cancellation step including:
- deriving from the adjusted baseband signal a second estimate for the processed signal, including subjecting the baseband signal to an estimation filtering operation based on the set of filter coefficients used in the first peak cancellation step;
 - 20 - assessing the second estimate to detect amplitude peaks;
 - further adjusting the adjusted baseband signal to prevent any amplitude peaks detected in the second estimate from appearing in the processed signal.
- 25
2. The method of claim 1, wherein one or more of the peak cancellation steps are performed in a forward direction only.
3. The method of claim 1 or 2, wherein in one or more of the peak cancellation steps the estimate for the processed signal is derived by simulating the effects of the one or more signal processing operations performed to generate the processed signal.
- 30
4. The method of claim 3, wherein deriving the estimate for the processed signal includes at least one of signal filtering and signal combination.
- 35

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5. The method of one of claims 1 to 4, wherein in one or more of the peak cancellation steps the assessment of the estimate for the processed signal includes a threshold decision.
- 5 6. The method of claim 5, wherein the assessment involves a routine that produces a train of output signals at the time positions of peak maxima which are higher than a threshold.
- 10 7. The method of one of claims 1 to 6, wherein in one or more of the peak cancellation steps the baseband signal to be processed is adjusted using a correction signal derived by way of filtering.
- 15 8. The method of claim 7, wherein during a particular peak cancellation step the filtering applied when deriving the estimate for the processed signal differs from the filtering applied when adjusting the signal to be processed.
- 20 9. The method of one of claims 1 to 8, further comprising determining and compensating at least a signal power loss that resulted from one or more of the peak cancellation steps.
- 25 10. The method of one of claims 1 to 9, further comprising subjecting the signal to be processed to at least one clipping step.
- 30 11. The method of one of claims 1 to 10, wherein a plurality of baseband signals in the form of individual carriers are in parallel subjected to a particular one of the peak cancellation steps.
- 35 12. The method of claim 11, wherein during the particular peak cancellation step a combined estimate is derived for the plurality of carriers and wherein the assessment is based on the combined estimate.
13. A computer program product comprising program code portions for performing the steps of one of claims 1 to 12 when the computer program product is run on a computing device.
14. The computer program product of claim 13, stored on a computer readable recording medium.

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15. A peak cancellation stage (32, 32') for preventing amplitude peaks from appearing in a processed signal that has been generated from at least one baseband signal by one or more signal processing operations, comprising:

- a first peak cancellation unit (32) including:
 - a) an estimating element (56) for deriving from the baseband signal to be processed a first estimate for the processed signal, wherein the estimating element (56) comprises an estimation filter (68) operating based on a set of filter coefficients;
 - b) a detector (58) for assessing the first estimate to detect amplitude peaks;
 - c) an adjusting element (64) for adjusting the baseband signal to prevent any amplitude peaks detected in the first estimate from appearing in the processed signal;
- at least one additional peak cancellation unit (32') arranged in a signal path behind the first peak cancellation unit (32) and including:
 - a) an estimating element for deriving from the adjusted baseband signal a second estimate for the processed signal, wherein the estimating element comprises an estimation filter operating based on the same set of filter coefficients like the first peak cancellation unit (32);
 - b) a detector for assessing the second estimate to detect amplitude peaks;
 - c) an adjusting element for further adjusting the adjusted baseband signal to prevent any amplitude peaks detected in the second estimate from appearing in the processed signal.

16. The peak cancellation stage of claim 15, wherein one or more of the peak cancellation units (32) have a first signal branch (50) including at least the estimating element (56) and the detector (58) and a second signal branch (52) arranged in parallel to the first signal branch (50) and including a delay element (54).

17. A transmitting device comprising the peak cancellation stage (32, 32') according to claim 15 or 16.